DECODING THE MYSTERY OF PRODUCTIVITY CLAIMS

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Associated General Contractors of America
2021 Surety Bonding and Construction Risk Management ConfCID 32>BDC q0.0000091o5.

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Jeff Katz is a Vice President of VERTEX, responsible for leading the contract claims practice and managing the surety team in the Northeast region. He is a graduate of Cornell University with a Bachelor of Science Degree in Civil Engineering and a registered professional engineer. Over the past 10 years, Jeff has been a consultant or expert on numerous large matters related to delay, schedule, and productivity impacts, additional cost, unforeseen conditions, design issues, overpayment, construction defects, and more. Jeff has presented at various industry events for AGC, Surety Claims Institute, CMAA, and more, and in 2018 was selected as one of *Civil + Structural Engineer*

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I. Introduction

Construction is fraught with risk borne by contractors and subcontractors when production cannot be achieved as planned, costs can quickly accrue. Despite being one of the most

$$= \frac{\quad}{\quad}$$

$$= 1000$$

$$= 50$$

$$= \frac{\quad}{\quad} = \frac{1000}{50} = 20$$

Figure 2. Sample Productivity Calculation

Output on a project is typically constant: in the absence of changes, there is a set amount of work to be performed. To achieve a desired output if productivity decreases, input must be increased, meaning more manpower or additional hours per person, and thus more input generally means greater cost. Rearranging, our formulas in Figure 1, we can represent the inverse relationship between input and productivity, as shown in Figure 3:

$$\frac{\quad}{\quad} =$$

$$= \qquad =$$

$$=$$

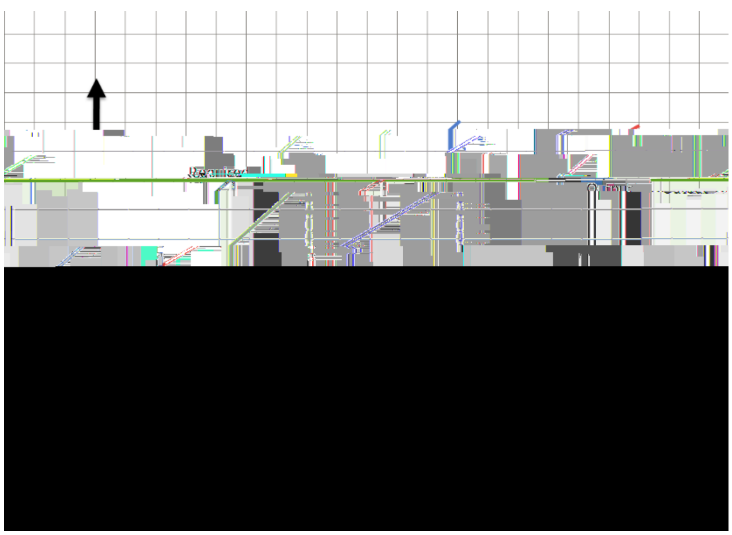

Figure 3. Inverse relationship between input and productivity

In the graphical relationship between input and productivity shown above, the steeper the slope of the line, the greater the productivity being achieved.

III. Factors Impacting Productivity

, which result in delays and additional costs. Understanding factors that impact productivity allow for mitigative measures to be implemented. Some of these factors are represented in Figure 4, with brief descriptions provided for each:

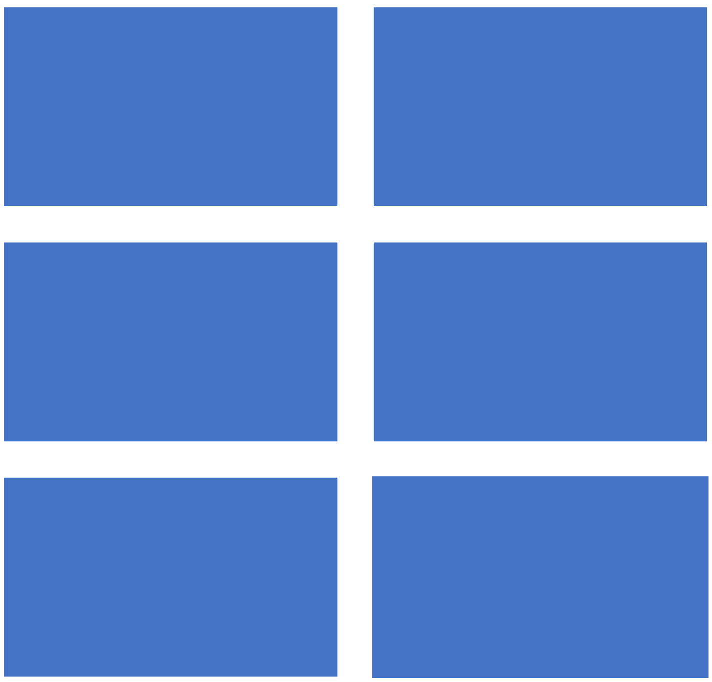

Figure 4. Exemplar factors which impact productivity

Schedule Acceleration

Acceleration occurs when the contractor speeds up his work so that he is performing the job at a faster rate than prescribed in the original contract.[2] A contractor may accelerate because they were directed to do so (known as actual acceleration, or directed acceleration) to overcome delays, or when an Owner (or contractor in the case of a subcontractor) refuses to grant a time extension and acceleration is necessary to achieve the unadjusted completion date, known as constructive acceleration. To justify that work has been accelerated, there must be an express order or some action equivalent to an order to comply with the original completion date without regard to excusable delays.[3]

[2] Donald R. Stewart & Assocs., Contracting & Material Co. v. City of Chicago, 20 Ill. App. 3d 685, 692, 314 N.E.2d 598, 604 (1974).
[3] Peter Kiewit and Sons Co., ASBCA, Nos. 9921 and 10440, 1969 BCA 7510, p. 34811 (1969).

Output following acceleration efforts does not increase in a linear fashion. Rather, there is a drop-off in productivity the more manpower is applied after a certain point (point of diminishing returns). Schedule compression in the form of overmanning the project site often results in significant productivity losses due to less effective supervision, material and/or equipment shortages, and diminished coordination capabilities.

Labor inefficiencies are often seen when personnel levels exceed those that can be effectively managed or adequately supervised. Similarly, when labor requirements exceed the available pool of qualified workers there will typically be a marked decrease in productivity. This is often seen when mandatory overtime or second shift work is implemented to mitigate schedule delays.

Out-of-Sequence Work

developed based on project scope, completion requirements, logical relationships, durations, resource availabilities, time constraints, and other information to model a time(mana)6(g)-9(e)4(d)] TJETQq0.00000912 0 612 792 reW*nBT/F470.000009792 re/F4 12 TfTotL8m

much of its work during the winter months because of delays for which the owner was responsible.

labor productivity. The Court held that the contractor was entitled to recover damages for lost productivity caused by the delay.

The National Electrical Contractors Association (NECA) conducted a series of laboratory studies to measure the effects of extreme combinations of temperature and humidity on labor productivity, with temperature and humidity extremes having the greatest productivity impacts, as shown in Figure 5.[6]

Figure 5. Data from NECA study: The Effect of Temperature on Productivity

Scope Changes

Nearly every construction project experiences changes in scope during performance of the work. However, changes beyond those reasonably expected given the nature of the work (cardinal change), or a high volume of changes to the project can lead to decreased productivity. Changes often cause delays and can require the removal of work already in place or the resequencing of the work plan; each of which may have an impact on productivity.

The impact of scope changes can vary based on timing late changes are typically more disruptive.[7] The cumulative impact of changes on productivity is modeled by the Ibbs curve, as shown in Figure 6, which demonstrates the greater volume of changes on a project, the more productivity will decrease:[8]

[6] Adapted from Table 2.1, NECA study: The Effect of Temperature on Productivity, 2004.

[7]

Figure 6. Ibbs Curve for cumulative impact of changes

5. Trade Stacking

Optimal productivity requires each crew member to have sufficient workspace to perform its tasks without interference. When several trades are working in the same space, the likelihood of interference increases which may result in decreased productivity. When there is more labor working in an area than the area can comfortably accommodate the probability of worker interference rises. In such scenarios, trades often experience a decline in productivity relative to the expected level, as shown in Figure 7: [9]

Figure 7. Impact of crowding on productivity

Overtime

scanning or staggered gate admittance) that further erode the amount of time available for production work.

Two construction industry organizations, the Sheet Metal and Air Conditioning National Electrical Contractors Association

and Productivity: Quantifying the Impact, Mitigation and Productivity Impacts for Sheet Metal, HVAC and Mechanical Co

respectively, examining and confirming impacts to Mechanical work and Electrical work as a result of COVID-19.[13, 14] The SMACNA report builds on the data published by ELECTRI.

shows that the Coronavirus pandemic and the related protocols and conditions have resulted in impacts across the construction industry. More specificallre3(re3(rO71(ECTR3(rI not)-3(s -89(te)4(da)4()4(late)

Notice Requirements

productivity claims. What is the triggering event? Is it upon knowledge of the disruption? Within how many days of the event must notice be provided? In *Fru-Con Constr. Corp. v. United States*, 43 Fed. Cl. 306 (1999), the court affirmed an award of $206,950 in assessed liquidated damages against the contractor because the contractor failed to provide adequate notice that its productivity losses were caused by unusually severe weather.

Generally, though, with government contracts, courts have not strictly construed notice requirements. Rather federal courts and boards have ruled that where government is otherwise aware of the changes causing the disruption, the notice requirement has been met.[15] Some even held that verbal notice is sufficient even where contract calls for written.[16] The bottom line though is that the best time to provide notice and act is when the triggering event first occurs or when the impacts are first realized.

How is the Productivity Claim Characterized in the Contract?

Contractors must carefully review their contract to find the applicable contract provision(s) that speak to a productivity claim. This may be a Changes clause, or Differing Site Conditions clause. A productivity claim is different from a pure delay or extension of time claim. *Sauer, Inc. v. Danzig*, 224 F.3d 1340, 1348 (Fed. Cir. 2000) discusses the difference between the two types of damages: disruption damages may be present even if project completed on time, where greater costs were incurred because of disruptive events that forced claimant to accelerate, resequence, increase manpower, etc. There does not have to be a delay for the productivity claim to be actionable.[17]

Contracts may also include restrictive provisions or exculpatory clauses, such as a waiver

well as a no-damages for delay clause. The enforceability of these clauses varies by state, and by public or private work.[18] Even where there may be a no damages for delay clause in a contract, some courts have found that such a clause would not preclude a claimant from recovering for disruption.[19]

[15] Ace Constructors, Inc. v. United States, 70 Fed. Cl. 253, 272 (2006).
[16] See Sheppard v. United States, 113 F. Supp. 648 (Ct. Cl. 1953); A.R. Mack Constr. Co., ASBCA 50035, 01-2 BCA ¶ 31,593 (2001).
[17] See, e.g., Appeals of States Roofing Corp., ASBCA No. 54860, 10-1 B.C.A. (CCH) ¶ 34356 (Jan. 12, 2010) (distinguishing between delay and loss of productivity and rejecting argument that contractor could not recover damages for the lost productivity without demonstrating that the impacted activities affected the completion schedule); City. of Galveston v. Triple B Servs., LLP, 498 S.W.3d 176 (Tex. App. 2016).
[18] Watt Tieder prepares a 50-state survey of key issues related to construction and engineering contracts, which includes enforceability of clauses such as no-damages-for-delay and waivers of consequential damage: https://50-state.watttieder.com/50stateanalysis#modal2
[19]

Proving Entitlement to Claim

To prove a claim for loss of productivity, a contractor generally bears the burden of proof for three elements: (1) liability; (2) causation; and (3) resultant injury for the impact of changes.[20] These elements generally must be proven by a preponderance of the evidence, meaning that the evidence must establish that it is more likely than not that each of these factors is present, and to recover for [21]

- Liability: Owner contractually responsible for impact, i.e., ;
- Causation: Impact caused labor overruns;
- Injury/Resultant Cost Increase: Impact caused compensable loss.

Liability

In contrast, in *Lamb Engineering*, the contractor successfully argued for inefficiency costs resulting from differing site conditions by providing detailed documentation and even video evidence of the differing site conditions.[25] It is with good reason that contemporaneous project records are the best resource for demonstrating causation.

Resultant Injury

Finally, the must prove that incurred damages. The case law does not require proof to an

In addition to exculpatory clauses, contractors should be wary of any rights to claims which may be released through release waivers, and especially change orders. When negotiating change orders, consideration should be given to whether the scope of release includes inefficiencies related to any particular change event. The inclusion of a broadly drafted
ability to make such claims. F

has been found to bar a related claim for cumulative impact.[30] Similarly, a release which waives
incident to such modifications

claims.[31]

V. How Productivity Impacts are Calculated

The quantifi

1. Project-Specific Methodologies

Courts, Boards, and other legal forums have demonstrated a predilection for damage calculations that directly relate to the project that is the subject of the claim and rely on contemporaneously prepared documentation. As such, techniques relying on project-specific data should be utilized whenever possible. The primary project-specific methodologies are the measured-mile and the earned value analysis.

ii. Measured Mile

While there is no consensus on the best method for calculating productivity losses, the measured mile approach is widely acknowledged as a highly favorable methodology.[32] A measured mile analysis compares identical tasks in an impacted and non-impacted period to calculate the productivity loss caused by a known disruption.[33] The measured mile is viewed favorably because its calculations contemplate actual contract performance rather than relying on initial estimates. In other words, it compares actual performance with actual performance; not theoretical or planned performance.

There are certain requirements that must be adhered to if the method is to be employed. The availability of reliable contemporaneous productivity data and the ability to identify a valid unimpacted period on the project are the two biggest barriers to entry for use of this methodology. Identifying the measured mile period mile method requires the non-impacted work to be comparable to the impacted work thereby allowing for a likewise comparison of labor efforts.

iii. Earned Value Analysis

In circumstances where insufficient physical unit production data is available, the concept of earned value analysis can be employed to demonstrate a loss of productivity. Earned value analysis evaluates how much time and budget should have been spent and compares it to the amount of work completed to date.[34] In other words, this method compares what was completed versus what was anticipated, i.e., the expected earnings per labor hour versus actual earnings per labor hours expended.

As with the measured mile, the earned value approach requires identification of periods for comparison. Such periods must allow for comparison of planned and actual performance during non-impacted and impacted periods. As such, the ability to identify a non-impacted period is a prerequisite for use of an earned value technique. While this technique is not a total cost approach, as it contemplates progress and cost of work in progress, it does require demonstration that the bid or estimate data being relied upon is realistic that there was no unimpacted period on the subject project that would permit a measured mile. may be met with skepticism given the variables and factors that inevitably differ between the comparable project and the subject project. As such, comparable project studies should be viewed as secondary options to project-specific calculation methods. However, this method also can help further a measured mile by bolstering the analysis. Showing the non-impacted productivity during the measured mile period is comparable to unimpacted comparable project helps establish reliability of the non-impacted productivity rate.

3. Specialty Industry Studies

If neither of the project-specific or project-comparison techniques are available, recommended practice is to rely on specialty or general industry studies to quantify loss of productivity damages.

Specialty industry studies are mostly commissioned by construction associations and organizations and are typically based on data compiled from actual construction projects. Some such studies measure the effects of acceleration, learning curve, overtime, and weather effects, among others. Most of these subject-specific productivity studies are either peer-reviewed scientific articles written on factors affecting labor productivity in construction projects or studies published by recognized labor associations and industry groups (Business Roundtable, Construction Industry Institute, etc.).

Contractors encounter a variety of challenges when developing loss of productivity claims based on specialty industry studies. The main challenges are to demonstrate entitlement and causation, to establish that the subject project ran into situations like those demonstrated in the specialized studies, and to demonstrate the reasonableness of estimated increased time and/or costs.

4. General Industry Studies

General industry studies are typically used when specialized studies are not applicable and when sufficient contemporaneous and project specific project documentation (such as detailed and/or reliable labor and production tracking records) do not exist to demonstrate the productivity loss. Calculations relying on general industry studies are subject to additional scrutiny because they are not project or subject specific and thus are less demonstrably applicable to the situation giving rise to the claim being prepared. T

Severe), determines the percent of loss fact to apply to the labor costs for the resultant productivity impact :[35]

[35] ty, Overtime: A

component in the claim, they can utilize impact factors from industry study data to prepare a prospective Time Impact Analysis (TIA) demonstrating the impact of the productivity loss on the , as shown in Figure 12:

Figure 12. Productivity impact factor used in Time-Impact Analysis

Courts and review boards have accepted industry studies, although success has varied. The success of calculations based on industry studies, or lack thereof, can likely be attributed to inadequate establishment of causation. below provides a survey of outcomes for productivity loss calculations based on these studies.[36]

Figure 13. Review of MCAA factor success rate in select cases

[36] Ibbs, W. & Sun, Xiaodan, "Proposed Improvements to the MCAA Method for Quantifying Construction Loss of Productivity," Department of Civil and Environmental Engineering University of California, Berkeley, May 2016, 56.

methodologies, it is critical to establish why such methods are not available when using another method. Use of a less-preferrable method without justification will certainly be challenged. Perhaps there was no impacted period, or there was not adequate contemporaneous documentation to use one of the preferred methods. The opposing party